WHAT IS CLAIMED IS:

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1. A compound of the following formula:

2 3 wherein 4 F is a fullerene core; 5 E is Y_1, Y_2 -amino, Y_2 -amino, $(Y_1, Y_2$ -alkyl)-amino, Y_1, Y_2 -ethylenediamino, 6 (dihydroxymethyl)alkylamino, $(X_1, X_3$ -aryl)amino, X_1, X_3 -aryloxy, Y_2 -alkoxy, Y_1, Y_2 -alkoxy, 7 (Y₁,Y₂-amino)alkoxy, (Y₁,Y₂,Y₃-aryl)oxy, (dihydroxyalkyl)-aryloxy, (Y₁,Y₂,Y₃-alkyl)amino, 8 $(Y_1, Y_2, Y_3$ -aryl)amino, dihydroxyalkylamino, Y_1, Y_2, Y_3 -alkoxy, (trihydroxyalkyl)alkoxy, 9 (trihydroxyalkyl)alkylamino, (dicarboxyalkyl)amino, $(Y_1, Y_2, Y_3-alkyl)$ thio, $(X_1, X_3-alkyl)$ 10 aryl)thio, (Y₁, Y₂-alkyl)thio, (dihydroxyalkyl)thio, Y₁, Y₂-dioxoalkyl, tri-(Y₁, Y₂, Y₃-11 methylaminocarboxyethyl)methylamino, ((glycosidyl)oxoheteroaryl)amino, 12 ((glycosidyl)oxoaryl)amino, (X₁,X₂,X₃-heteroaryl)amino, (X₁-diarylketone)amino, (T,X₁-13 oxoaryl)amino, (T,X₁-dioxoaryl)amino, (Y₁-alkyl,Y₂-alkyldioxoheteroaryl)amino, (Y₁-14 alkyl, Y₂-alkyldioxoaryl)amino, (di(Y₁, Y₂-methyl)dioxoheteroaryl)amino, (di(Y₁, Y₂-15 methyl)dioxoaryl)amino, ((glycosidyl)heteroaryl)amino, ((glycosidyl)aryl)amino, 16 ((carboxylacetylalkyl)oxo-heteroaryl)amino, ((carboxylacetylalkyl)oxoaryl)amino, 17 ((isopropylaminohydroxy-alkoxy)aryl)amino, $(X_1, X_2, X_3$ -alkylaryl)amino, $(X_1, X_2, X_3$ -18 heteroaryl)oxy, (isopropylaminohydroxyalkyl)aryloxy, (X₁,X₂,X₃-oxoheteroaryl)oxy, 19 $(X_1, X_2, X_3$ -oxoaryl)oxy, $(X_1, Y_1$ -oxoheteroaryl)oxy, $(X_1$ -diarylketone)oxy, $(T, X_1$ -oxoaryl)oxy, 20 $(X_1, X_2$ -dioxoaryl)oxy, $(Y_1, Y_2, di$ -aminodihydroxy)alkyl, $(X_1, X_2$ -heteroaryl)thio, 21 ((tricarboxylalkyl)ethylene-diamino)alkoxy, $(X_1, X_2$ -oxoaryl)thio, $(X_1, X_2$ -dioxoaryl)thio, 22 (glycosidylheteroaryl)thio, (glycosidylaryl)thio, Y₁-alkyl(thiocarbonyl)thio, Y₁,Y₂,-23

alkyl(thiocarbonyl)thio, Y1,Y2,Y3-alkyl(thiocarbonyl)thio, (Y1,Y2-aminothiocarbonyl)thio,

(pyranosyl)thio, cysteinyl, tyrosinyl, (phenylalainyl)amino, (dicarboxyalkyl)thio,

 $(aminoaryl)_{1-100}$ amino, $(pyranosyl)_{1-100}$ amino, $(Y_1-aminoaryl)_{1-100}$ amino,

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(amino(sulfoaryl))1100amino, peptidyl, thymidinyl, uridinyl, guanosinyl, adenosinyl,
27
                                          cholesteryl, or biotinylalkoxy; each T, independently, being halo;
28
                                                                                   each of X_1, X_2, X_3, X_4, and X_5, independently, is -Y_2, -O-Y_2, -S-Y_2, -NH-Y_2, -CO-O-V_2, -S-Y_2, -NH-Y_2, -CO-V_2, -S-Y_2, -CO-V_2, -S-Y_2, -CO-V_2, -S-Y_2, -CO-V_2, -CO
29
                                          Y_2, -O-CO-Y_2, -CO-NH-Y_2, -CO-NY<sub>1</sub>Y_2, -NH-CO-Y_2, -SO<sub>2</sub>-Y_2, -SO<sub>2</sub>-O-Y_2, -CHY<sub>1</sub>Y_2, or
30
                                           -NY_1Y_2;
31
                                                                                     each of Y1, Y2, and Y3, independently or taken together, is -B-Z or -Z; in which each
32
                                          B, independently, is -R^a-O-[Si(CH<sub>3</sub>)<sub>2</sub>-O-]<sub>1-100</sub>, C<sub>1-2000</sub> alkyl, C<sub>6-40</sub> aryl, C<sub>7-2000</sub> alkylaryl, C<sub>7-2000</sub>
 33
                                           _{2000} arylalkyl, (C_{1-30} alkyl ether)_{1-100}, (C_{6-40} aryl ether)_{1-100}, (C_{7-2000} alkylaryl ether)_{1-100}, (C_{7-2000} alkylaryl ether)_{1-100}, (C_{7-2000}
 34
                                            _{2000} arylalkyl ether)_{1-100}, (C_{1-30} alkyl thioether)_{1-100}, (C_{6-40} aryl thioether)_{1-100}, (C_{7-2000} alkylaryl
 35
                                            thioether)<sub>1-100</sub>, (C_{7-2000} \text{ arylalkyl thioether})_{1-100}, (C_{2-50} \text{ alkyl ester})_{1-100}, (C_{7-2000} \text{ aryl ester})_{1-100},
 36
                                            (C_{8-2000} \text{ alkylaryl ester})_{1-100}, (C_{8-2000} \text{ arylalkyl ester})_{1-100}, -R^a-CO-O-(C_{1-30} \text{ alkyl ether})_{1-100}, -R^a-CO-O-(C_{1-30} \text{ alkyl
 37
                                            R^a\text{-CO-O-}(C_{6\text{--}40} \text{ aryl ether})_{1\text{--}100}, -R^a\text{-CO-O-}(C_{7\text{--}2000} \text{ alkylaryl ether})_{1\text{--}100}, -R^a\text{-CO-O-}(C_{7\text{--}2000} \text{ alkylaryl ether})_{1\text{--}100}, -R^a\text{-CO-O-}(C_{7\text{--}2000} \text{ alkylaryl ether})_{1\text{--}100}, -R^a\text{-CO-O-}(C_{7\text{--}2000} \text{ alkylaryl ether})_{1\text{--}100}, -R^a\text{--CO-O-}(C_{7\text{--}2000} \text{ alkylaryl ether})_{1\text{--}100}, -R^a\text{--C
  38
                                            arylalkyl ether)<sub>1-100</sub>, (C_{4-50} \text{ alkyl urethane})_{1-100}, (C_{14-60} \text{ aryl urethane})_{1-100}, (C_{10-2000} \text{ alkylaryl urethane})_{1-100}
   39
                                             ure than e)_{1-100}, (C_{10-2000} \ arylalkyl \ ure than e)_{1-100}, (C_{5-50} \ alkyl \ ure a)_{1-100}, (C_{14-60} \ aryl \ ure a)_{1-100},
   40
                                              (C_{10\text{-}2000} \text{ alkylaryl urea})_{1\text{-}100}, (C_{10\text{-}2000} \text{ arylalkyl urea})_{1\text{-}100}, (C_{2\text{-}50} \text{ alkyl amide})_{1\text{-}100}, (C_{7\text{-}60} \text{ arylalkyl urea})_{1\text{-}100}, (C_{2\text{-}50} \text{ alkyl amide})_{1\text{-}100}, (C_{7\text{-}60} \text{ arylalkyl urea})_{1\text{-}100}, (C_{7\text{-}60} \text{ ary
    41
                                              amide)_{1-100}, (C_{8-2000} alkylaryl amide)_{1-100}, (C_{8-2000} arylalkyl amide)_{1-100}, (C_{3-30} alkylaryl amide)_{1-100}
    42
                                              anhydride)_{1-100}, (C<sub>8-50</sub> aryl anhydride)_{1-100}, (C<sub>9-2000</sub> alkylaryl anhydride)_{1-100}, (C<sub>9-2000</sub> arylalkyl
    43
                                              anhydride)_{1-100}, (C_{2-30} \text{ alkyl carbonate})_{1-100}, (C_{7-50} \text{ aryl carbonate})_{1-100}, (C_{8-2000} \text{ alkylaryl carbonate})_{1-100}
    44
                                              carbonate)_{1\text{-}100}, (C_{8\text{-}2000} \text{ arylalkyl carbonate})_{1\text{-}100}, \text{-}R^a\text{-}O\text{-}CO\text{-}NH\text{-}(R^b \text{ or } Ar\text{-}R^b\text{-}Ar)\text{-}NH\text{-}CO\text{-}O\text{-}NH\text{-}(R^b \text{ or } Ar)\text{-}NH\text{-}CO\text{-}O\text{-}NH\text{-}(R^b \text{ or } Ar)\text{-}NH\text{-}CO\text{-}O\text{-}NH\text{-}(R^b \text{ or } Ar)\text{-}NH\text{-}(R^b \text{-}R^b \text{-}Ar)\text{-}NH\text{-}CO\text{-}O\text{-}NH\text{-}(R^b \text{-}Ar)\text{-}NH\text{-}(R^b \text{-}Ar)\text{-}NH\text{-}(R
     45
                                              (C_{1-30} alkyl ether, C_{6-40} aryl ether, C_{7-2000} alkylaryl ether, or C_{7-2000} arylalkyl ether)<sub>1-100</sub>, -R<sup>a</sup>-
     46
                                               O-CO-NH-(R^b or Ar-R^b-Ar)-NH-CO-O-(C_{2-50} alkyl ester, C_{7-60} aryl ester, C_{8-2000} alkylaryl
      47
                                                ester, or C_{8-2000} arylalkyl ester)<sub>1-100</sub>, -R<sup>a</sup>-O-CO-NH-(R<sup>b</sup> or Ar-R<sup>b</sup>-Ar)-NH-CO-O-(C_{1-30} alkyl
       48
                                                 ether, C<sub>6-40</sub> aryl ether, C<sub>7-2000</sub> alkylaryl ether, or C<sub>7-2000</sub> arylalkyl ether)<sub>1-100</sub>-CO-NH-(R<sup>b</sup> or
       49
                                                 Ar-Rb-Ar)-NH-CO-O-, -Ra-O-CO-NH-(Rb or Ar-Rb-Ar)-NH-CO-O-(C2-50 alkyl ester, C7-60
       50
                                                 aryl ester, C_{8-2000} alkylaryl ester, or C_{8-2000} arylalkyl ester)<sub>1-100</sub>-R<sup>c</sup>-O-CO-NH-(R<sup>b</sup> or Ar-R<sup>b</sup>-
       51
                                                 Ar)-NH-CO-O-, -Ra-NH-CO-NH-(Rb or Ar-Rb-Ar)-NH-CO-O-(C1-30 alkyl ether, C6-40 aryl
       52
                                                 ether, C<sub>7-2000</sub> alkylaryl ether, or C<sub>7-2000</sub> arylalkyl ether)<sub>1-100</sub>, -R<sup>a</sup>-NH-CO-NH-(R<sup>b</sup> or Ar-R<sup>b</sup>-
       53
                                                  Ar)-NH-CO-O-(C2-50 alkyl ester, C7-60 aryl ester, C8-2000 alkylaryl ester, or C8-2000 arylalkyl
        54
                                                  ester)_{1-100}, -R^a-NH-CO-NH-(R^b or Ar-R^b-Ar)-NH-CO-O-(C_{1-30} alkyl ether, C_{6-40} aryl ether,
        55
                                                  C_{7-2000} alkylaryl ether, or C_{7-2000} arylalkyl ether)<sub>1-100</sub>-CO-NH-(R^b or Ar-R^b-Ar)-NH-CO-O-,
        56
                                                    -Ra-NH-CO-NH-(Rb or Ar-Rb-Ar)-NH-CO-O-(C2-50 alkyl ester, C7-60 aryl ester, C8-2000
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alkylaryl ester, or C<sub>8-2000</sub> arylalkyl ester)<sub>1-100</sub>-R<sup>c</sup>-O-CO-NH-(R<sup>b</sup> or Ar-R<sup>b</sup>-Ar)-NH-CO-O-,
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- -Ra-O-CO-NH-(Rb or Ar-Rb-Ar)-NH-CO-NH-(C_{2-50} alkyl amide, C_{7-60} aryl amide, C_{8-2000}
- alkylaryl amide, or C₈₋₂₀₀₀ arylalkyl amide)₁₋₁₀₀, or -R^a-NH-CO-NH-(R^b or Ar-R^b-Ar)-NH-
- 61 CO-NH-(C₂₋₅₀ alkyl amide, C₇₋₆₀ aryl amide, C₈₋₂₀₀₀ alkylaryl amide, or C₈₋₂₀₀₀ arylalkyl
- amide)₁₋₁₀₀; and each Z, independently, is -H or -G-D, wherein G is -R^a-, -R^a-Ar-, -Ar-R^a-, or
- 63 -Ar-; and D is -H, -OH, -SH, -NH₂, -NHOH, -SO₃H, -OSO₃H, -CO₂H, -CONH₂,
- 64 -CONHNH₂, -CH(NH₂)-CO₂H, -NH-CH₂-CO₂H, -P(OH)₃, -PO(OH)₂, -O-PO(OH)₂, -O-
- PO(OH)-O-PO(OH)₂, -O-PO(O $^-$)-O-CH₂CH₂NH₃ $^+$, -O-PO(O $^-$)-O-CH₂CH₂-N $^+$ (CH₃)₃, -
- glycoside, -oligosaccharide, -CO-glycoside, -CO-oligosaccharide, -OCH₃, -OCH₂(CHOH)₄-
- 67 CH_2OH , $-OCH_2(CHOH)_2$ - CH_2OH , $-CO-OCH_2(CHOH)_4$ - CH_2OH , $-C_6H_3(OH)_2$,
- $-N(CH_2CO_2H)_2$, $-CO-N(CH_2CO_2H)_2$, $-CO-NH-C(CH_2CH_2CO_2H)_3$, $-CO-NH-C(CH_2CO_2H)_3$, $-CO-NH-C(CO-NH-C(CO_2H)_3$, $-CO-NH-C(CO-NH-C(CO_2H)_3$, $-CO-NH-C(CO-NH-C(CO_2H)_3$, $-CO-NH-C(CO-NH-C(CO-NH-C(CH_2CO_2H)_3$, -CO-NH-C(CO-N
- 69 $C(CH_2CH_2OH)_3$, $-[CH_2-CH(CO_2R^a)]_{1-100}-H$, $-NH_3^+$, $-N^+H_2R^a$, $-N^+HR^aR^b$, or $-N^+R^aR^bR^c$; each
- of R^a, R^b, and R^c, independently, being C₁₋₂₀ linear or branched alkyl, and Ar being aryl;
- 71 R is hydroxy or amino;
- 72 W is O, $C(CN)_2$, $N^+Y_1Y_2$, or V;
- 73 V is C_{5-20} aryl or C_{2-20} heteroaryl;
- 74 n is 1-10;
- 75 p is 0-20;
- 76 q is 0-20; and
- 77 r is 0 or 1.

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- The compound of claim 1, wherein F is a fullerene core of C₆₀, C₇₀, C₇₆, C₇₈, C₈₂, C₈₄, C₉₂
 (methano)_nC₆₀, (pyrrolidino)_nC₆₀, La@C_s, Ho@C_s, Gd@C_s, or Er@C_s, in which n is 1-10,
- and s is 60, 74, or 82.
- 3. The compound of claim 2, wherein F is a fullerene core of C_{60} , C_{70} , or C_{84} .
- 4. The compound of claim 1, wherein each of X₁, X₂, X₃, X₄, and X₅, independently, is hydrogen.

- 5. The compound of claim 1, wherein each of Y₁, Y₂, and Y₃, independently, is hydrogen, C₁₋₂₀₀₀ alkyl, C₆₋₄₀ aryl, or C₇₋₂₀₀₀ arylalkyl, optioanly substituted with -OH, -SH, -NH₂, -NHOH, -SO₃H, -OSO₃H, -CO₂H, -CONH₂, -CONHNH₂, -CH(NH₂)-CO₂H, -NH-CH₂-
- 91 CO_2H , $-NH_3^+$, $-N^+H_2R^a$, $-N^+HR^aR^b$, or $-N^+R^aR^bR^c$,
- 6. The compound of claim 1, wherein each of Y₁, Y₂, and Y₃, independently, is ethyl, hydroxyethyl, methoxyethyl, solfonylbutoxyethyl, hydroxycarbonylmethyl, or hydroxycarbonylethyl.
- 7. The compound of claim 1, wherein r is 0.

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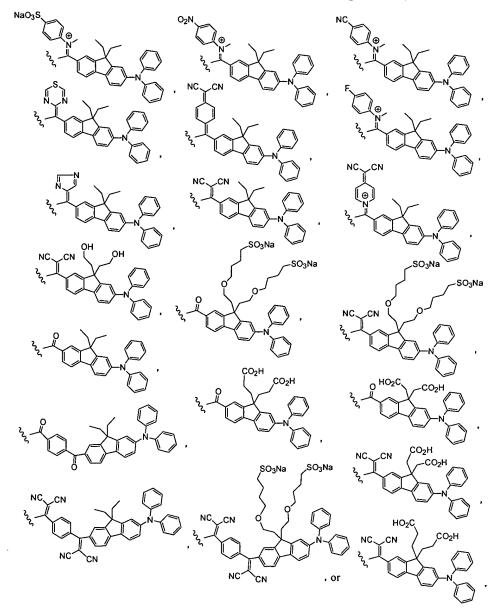
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- 8. The compound of claim 1, wherein r is 1, and V is aryl.
- 9. The compound of claim 8, wherein V is phenyl.
- 10. The compound of claim 1, wherein W is O, C(CN)₂, heteroaryl, N⁺Y₁Y₂, each of Y₁ and Y₂, independently, being hydrogen, alkyl, aryl, or heteroaryl, or, together, being ary or heteroaryl.
- 11. The compound of claim 10, wherein W is O, C(CN)₂,

12. The compound of claim 1, wherein E is Y₁,Y₂-amino, Y₂-amino, (Y₁,Y₂-alkyl)-amino,
Y₁,Y₂-ethylenediamino, (dihydroxymethyl)alkylamino, (X₁,X₃-aryl)amino, (Y₁,Y₂,Y₃alkyl)amino, (Y₁,Y₂,Y₃-aryl)amino, dihydroxyalkylamino, (trihydroxyalkyl)alkylamino,
or (dicarboxyalkyl)amino; and p is 1-4.

- 13. The compound of claim 12, wherein E is diphenylamino.
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- 14. The compound of claim 1, wherein R is hydroxy or amino.
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- 15. The compound of claim 1, wherein q is 0.
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- 119 16. The compound of claim 1, wherein the compound is of the following structure of $F(-M)_n$,
- in which F is a fullerene core of C₆₀, n is 1-6, each M, independently, is



17. A pharmaceutical composition, comprising a pharmaceutically acceptable carrier and a compound of the following formula:

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$$\begin{bmatrix} X_2 & X_1 & Y_1 & Y_2 & W \\ X_3 & X_4 & X_5 & P \end{bmatrix} F(-E)_p(-R)_q$$

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wherein

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F is a fullerene core; E is Y_1, Y_2 -amino, Y_2 -amino, $(Y_1, Y_2$ -alkyl)-amino, Y_1, Y_2 -ethylenediamino, (dihydroxymethyl)alkylamino, $(X_1, X_3$ -aryl)amino, X_1, X_3 -aryloxy, Y_2 -alkoxy, Y_1, Y_2 -alkoxy, $(Y_1,Y_2$ -amino)alkoxy, $(Y_1,Y_2,Y_3$ -aryl)oxy, (dihydroxyalkyl)-aryloxy, $(Y_1,Y_2,Y_3$ -alkyl)amino, (Y₁,Y₂,Y₃-aryl)amino, dihydroxyalkylamino, Y₁,Y₂,Y₃-alkoxy, (trihydroxyalkyl)alkoxy, (trihydroxyalkyl)alkylamino, (dicarboxyalkyl)amino, Y_2 -thio, $(Y_1, Y_2, Y_3$ -alkyl)thio, $(X_1, X_3$ $aryl) thio, (Y_1, Y_2 - alkyl) thio, (dihydroxyalkyl) thio, Y_1, Y_2 - dioxoalkyl, tri-(Y_1, Y_2, Y_3 - alkyl) thio, (Y_1, Y_2 - alkyl) thio, (Y$ methylaminocarboxyethyl)methylamino, ((glycosidyl)oxoheteroaryl)amino, ((glycosidyl)oxoaryl)amino, $(X_1, X_2, X_3$ -heteroaryl)amino, $(X_1$ -diarylketone)amino, $(T, X_1$ oxoaryl) amino, $(T, X_1$ -dioxoaryl) amino, $(Y_1$ -alkyl, Y_2 -alkyldioxoheteroaryl) alkyl, Y_2 -alkyldioxoaryl)amino, (di $(Y_1,Y_2$ -methyl)dioxoheteroaryl)amino, (di (Y_1,Y_2) -met methyl)dioxoaryl)amino, ((glycosidyl)heteroaryl)amino, ((glycosidyl)aryl)amino, ((carboxylacetylalkyl)oxo-heteroaryl)amino, ((carboxylacetylalkyl)oxoaryl)amino, heteroaryl)oxy, (isopropylaminohydroxyalkyl)aryloxy, $(X_1, X_2, X_3$ -oxoheteroaryl)oxy, $(X_1, X_2, X_3$ -oxoaryl)oxy, $(X_1, Y_1$ -oxoheteroaryl)oxy, $(X_1$ -diarylketone)oxy, $(T, X_1$ -oxoaryl)oxy, $(X_1, X_2$ -dioxoaryl)oxy, $(Y_1, Y_2, di$ -aminodihydroxy)alkyl, $(X_1, X_2$ -heteroaryl)thio, ((tricarboxylalkyl)ethylene-diamino)alkoxy, $(X_1, X_2$ -oxoaryl)thio, $(X_1, X_2$ -dioxoaryl)thio, (glycosidylheteroaryl)thio, (glycosidylaryl)thio, Y_1 -alkyl(thiocarbonyl)thio, Y_1, Y_2, \dots alkyl(thiocarbonyl)thio, Y1,Y2,Y3-alkyl(thiocarbonyl)thio, (Y1,Y2-aminothiocarbonyl)thio, (pyranosyl)thio, cysteinyl, tyrosinyl, (phenylalainyl)amino, (dicarboxyalkyl)thio, (aminoaryl)₁₋₁₀₀amino, (pyranosyl)₁₋₁₀₀amino, (Y₁-aminoaryl)₁₋₁₀₀amino,

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cholesteryl, or biotinylalkoxy; each T, independently, being halo;
151
                         each of X_1, X_2, X_3, X_4, and X_5, independently, is -Y_2, -O-Y_2, -S-Y_2, -NH-Y_2, -CO-O-V_2
152
             Y_2, -O-CO-Y_2, -CO-NH-Y_2, -CO-NY<sub>1</sub>Y_2, -NH-CO-Y_2, -SO<sub>2</sub>-Y_2, -SO<sub>2</sub>-O-Y_2, -CHY<sub>1</sub>Y_2, or
153
             -NY_1Y_2;
154
                         each of Y<sub>1</sub>, Y<sub>2</sub>, and Y<sub>3</sub>, independently or taken together, is -B-Z or -Z; in which each
155
             B, independently, is -R^a-O-[Si(CH<sub>3</sub>)<sub>2</sub>-O-]<sub>1-100</sub>, C<sub>1-2000</sub> alkyl, C<sub>6-40</sub> aryl, C<sub>7-2000</sub> alkylaryl, C<sub>7-2000</sub>
156
             _{2000} arylalkyl, (C_{1-30} alkyl ether)_{1-100}, (C_{6-40} aryl ether)_{1-100}, (C_{7-2000} alkylaryl ether)_{1-100}, (C_{7-2000}
157
             _{2000} arylalkyl ether)<sub>1-100</sub>, (C<sub>1-30</sub> alkyl thioether)<sub>1-100</sub>, (C<sub>6-40</sub> aryl thioether)<sub>1-100</sub>, (C<sub>7-2000</sub> alkylaryl
158
             thioether)<sub>1-100</sub>, (C_{7-2000} \text{ arylalkyl thioether})_{1-100}, (C_{2-50} \text{ alkyl ester})_{1-100}, (C_{7-2000} \text{ aryl ester})_{1-100},
159
             (C_{8-2000} \text{ alkylaryl ester})_{1-100}, (C_{8-2000} \text{ arylalkyl ester})_{1-100}, -R^a-CO-O-(C_{1-30} \text{ alkyl ether})_{1-100}, -
160
             R^{a}-CO-O-(C_{6-40} aryl ether)<sub>1-100</sub>, -R^{a}-CO-O-(C_{7-2000} alkylaryl ether)<sub>1-100</sub>, -R^{a}-CO-O-(C_{7-2000}
161
             arylalkyl ether)<sub>1-100</sub>, (C_{4-50} \text{ alkyl urethane})_{1-100}, (C_{14-60} \text{ aryl urethane})_{1-100}, (C_{10-2000} \text{ alkylaryl})_{1-100}
162
             urethane)<sub>1-100</sub>, (C_{10-2000} \text{ arylalkyl urethane})_{1-100}, (C_{5-50} \text{ alkyl urea})_{1-100}, (C_{14-60} \text{ aryl urea})_{1-100},
163
             (C_{10-2000} \text{ alkylaryl urea})_{1-100}, (C_{10-2000} \text{ arylalkyl urea})_{1-100}, (C_{2-50} \text{ alkyl amide})_{1-100}, (C_{7-60} \text{ arylalkyl urea})_{1-100}
164
              amide)<sub>1-100</sub>, (C_{8-2000} \text{ alkylaryl amide})_{1-100}, (C_{8-2000} \text{ arylalkyl amide})_{1-100}, (C_{3-30} \text{ alkyl})
165
              anhydride)<sub>1-100</sub>, (C_{8-50} \text{ aryl anhydride})_{1-100}, (C_{9-2000} \text{ alkylaryl anhydride})_{1-100}, (C_{9-2000} \text{ arylalkyl})_{1-100}
166
              anhydride)<sub>1-100</sub>, (C_{2-30} \text{ alkyl carbonate})_{1-100}, (C_{7-50} \text{ aryl carbonate})_{1-100}, (C_{8-2000} \text{ alkylaryl})
167
             carbonate)<sub>1-100</sub>, (C<sub>8-2000</sub> arylalkyl carbonate)<sub>1-100</sub>, -R<sup>a</sup>-O-CO-NH-(R<sup>b</sup> or Ar-R<sup>b</sup>-Ar)-NH-CO-O-
168
             (C_{1-30} \text{ alkyl ether}, C_{6-40} \text{ aryl ether}, C_{7-2000} \text{ alkylaryl ether}, \text{ or } C_{7-2000} \text{ arylalkyl ether})_{1-100}, -R^a
169
             O-CO-NH-(R<sup>b</sup> or Ar-R<sup>b</sup>-Ar)-NH-CO-O-(C<sub>2-50</sub> alkyl ester, C<sub>7-60</sub> aryl ester, C<sub>8-2000</sub> alkylaryl
170
             ester, or C<sub>8-2000</sub> arylalkyl ester)<sub>1-100</sub>, -R<sup>a</sup>-O-CO-NH-(R<sup>b</sup> or Ar-R<sup>b</sup>-Ar)-NH-CO-O-(C<sub>1-30</sub> alkyl
171
              ether, C_{6-40} aryl ether, C_{7-2000} alkylaryl ether, or C_{7-2000} arylalkyl ether)<sub>1-100</sub>-CO-NH-(R^b or
172
             Ar-R<sup>b</sup>-Ar)-NH-CO-O-, -R<sup>a</sup>-O-CO-NH-(R<sup>b</sup> or Ar-R<sup>b</sup>-Ar)-NH-CO-O-(C<sub>2-50</sub> alkyl ester, C<sub>7-60</sub>
173
             aryl ester, C_{8-2000} alkylaryl ester, or C_{8-2000} arylalkyl ester)<sub>1-100</sub>-R<sup>c</sup>-O-CO-NH-(R<sup>b</sup> or Ar-R<sup>b</sup>-
174
             Ar)-NH-CO-O-, -Ra-NH-CO-NH-(Rb or Ar-Rb-Ar)-NH-CO-O-(C1-30 alkyl ether, C6-40 aryl
175
             ether, C<sub>7-2000</sub> alkylaryl ether, or C<sub>7-2000</sub> arylalkyl ether)<sub>1-100</sub>, -R<sup>a</sup>-NH-CO-NH-(R<sup>b</sup> or Ar-R<sup>b</sup>-
176
             Ar)-NH-CO-O-(C_{2-50} alkyl ester, C_{7-60} aryl ester, C_{8-2000} alkylaryl ester, or C_{8-2000} arylalkyl
177
             ester)<sub>1-100</sub>, -R<sup>a</sup>-NH-CO-NH-(R<sup>b</sup> or Ar-R<sup>b</sup>-Ar)-NH-CO-O-(C<sub>1-30</sub> alkyl ether, C<sub>6-40</sub> aryl ether,
178
             C<sub>7-2000</sub> alkylaryl ether, or C<sub>7-2000</sub> arylalkyl ether)<sub>1-100</sub>-CO-NH-(R<sup>b</sup> or Ar-R<sup>b</sup>-Ar)-NH-CO-O-,
179
             -R<sup>a</sup>-NH-CO-NH-(R<sup>b</sup> or Ar-R<sup>b</sup>-Ar)-NH-CO-O-(C<sub>2-50</sub> alkyl ester, C<sub>7-60</sub> aryl ester, C<sub>8-2000</sub>
180
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(amino(sulfoaryl))₁₁₀₀amino, peptidyl, thymidinyl, uridinyl, guanosinyl, adenosinyl,

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alkylaryl ester, or C<sub>8-2000</sub> arylalkyl ester)<sub>1-100</sub>-R<sup>c</sup>-O-CO-NH-(R<sup>b</sup> or Ar-R<sup>b</sup>-Ar)-NH-CO-O-,
181
                           -R<sup>a</sup>-O-CO-NH-(R<sup>b</sup> or Ar-R<sup>b</sup>-Ar)-NH-CO-NH-(C<sub>2-50</sub> alkyl amide, C<sub>7-60</sub> aryl amide, C<sub>8-2000</sub>
182
                           alkylaryl amide, or C<sub>8-2000</sub> arylalkyl amide)<sub>1-100</sub>, or -R<sup>a</sup>-NH-CO-NH-(R<sup>b</sup> or Ar-R<sup>b</sup>-Ar)-NH-
183
                           CO-NH-(C_{2-50} alkyl amide, C_{7-60} aryl amide, C_{8-2000} alkylaryl amide, or C_{8-2000} arylalkyl
184
                           amide)<sub>1-100</sub>; and each Z, independently, is -H or -G-D, wherein G is -R<sup>a</sup>-, -R<sup>a</sup>-Ar-, -Ar-R<sup>a</sup>-, or
185
                            -Ar-: and D is -H. -OH. -SH. -NH<sub>2</sub>, -NHOH, -SO<sub>3</sub>H, -OSO<sub>3</sub>H, -CO<sub>2</sub>H, -CONH<sub>2</sub>,
186
                           -CONHNH<sub>2</sub>, -CH(NH<sub>2</sub>)-CO<sub>2</sub>H, -NH-CH<sub>2</sub>-CO<sub>2</sub>H, -P(OH)<sub>3</sub>, -PO(OH)<sub>2</sub>, -O-PO(OH)<sub>2</sub>, 
187
                           PO(OH)-O-PO(OH)_2, -O-PO(O^-)-O-CH_2CH_2NH_3^+, -O-PO(O^-)-O-CH_2CH_2-N^+(CH_3)_3,
188
                            -glycoside, -oligosaccharide, -CO-glycoside, -CO-oligosaccharide, -OCH<sub>3</sub>, -OCH<sub>2</sub>(CHOH)<sub>4</sub>-
189
                            CH<sub>2</sub>OH, -OCH<sub>2</sub>(CHOH)<sub>2</sub>-CH<sub>2</sub>OH, -CO-OCH<sub>2</sub>(CHOH)<sub>4</sub>-CH<sub>2</sub>OH, -C<sub>6</sub>H<sub>3</sub>(OH)<sub>2</sub>,
190
                            -N(CH<sub>2</sub>CO<sub>2</sub>H)<sub>2</sub>, -CO-N(CH<sub>2</sub>CO<sub>2</sub>H)<sub>2</sub>, -CO-NH-C(CH<sub>2</sub>CH<sub>2</sub>CO<sub>2</sub>H)<sub>3</sub>, -CO-NH-
191
                           C(CH_2CH_2OH)_3, -[CH_2-CH(CO_2R^a)]_{1-100}-H, -NH_3^+, -N^+H_2R^a, -N^+HR^aR^b, or -N^+R^aR^bR^c, each
192
                            of R<sup>a</sup>, R<sup>b</sup>, and R<sup>c</sup>, independently, being C<sub>1-20</sub> linear or branched alkyl, and Ar being aryl;
193
                                                    R is alkyl, hydroxy, or amino;
194
                                                    W is O, C(CN)<sub>2</sub>, N^{+}Y_{1}Y_{2}, or V;
 195
                                                    V is C_{5-20} aryl or C_{2-20} heteroaryl;
 196
                                                    n is 1-10;
 197
                                                    p is 0-20;
 198
                                                    q is 0-20; and
 199
                                                    r is 0 or 1.
 200
 201
                             18. The pharmaceutical composition of claim 17, wherein wherein F is a fullerene core of
 202
                                         C<sub>60</sub>, C<sub>70</sub>, C<sub>76</sub>, C<sub>78</sub>, C<sub>82</sub>, C<sub>84</sub>, C<sub>92</sub> (methano)<sub>n</sub>C<sub>60</sub>, (pyrrolidino)<sub>n</sub>C<sub>60</sub>, La@C<sub>s</sub>, Ho@C<sub>s</sub>,
 203
                                         Gd@C_s, or Er@C_s, in which n is 1-10, and s is 60, 74, or 82.
 204
 205
                              19. The pharmaceutical composition of claim 17, wherein each of X_1, X_2, X_3, X_4, and X_5,
  206
                                         independently, is hydrogen.
  207
  208
                             20. The pharmaceutical composition of claim 17, wherein the compound is of the following
  209
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structure of F(-M)_n, in which F is a fullerene core of C₆₀, n is 1-6, each M, independently,

210

211

is: